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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/055,667	01/22/2002	Norihisa Mino	10873.876US01	8002
23552	7590	10/26/2004	EXAMINER	
<b>MERCHANT &amp; GOULD PC</b> P.O. BOX 2903 MINNEAPOLIS, MN 55402-0903				BERNATZ, KEVIN M
ART UNIT		PAPER NUMBER		
1773				

DATE MAILED: 10/26/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No.	Applicant(s)
	10/055,667	MINO ET AL.
	Examiner	Art Unit
	Kevin M Bernatz	1773

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address.  
Period for Reply

**A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.**

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) Responsive to communication(s) filed on \_\_\_\_\_.
- 2a) This action is **FINAL**.                                    2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) Claim(s) 1-12 and 36-40 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 1-12 and 36-40 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) All    b) Some \* c) None of:
  1. Certified copies of the priority documents have been received.
  2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 7/2/04
- 4) Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) Notice of Informal Patent Application (PTO-152)
- 6) Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Response to Amendment***

1. Amendments to claims 1 and 36 - 40, and cancellation of claims 13 – 35 and 41 - 55, filed on July 23, 2004, have been entered in the above-identified application.
2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

### ***Examiner's Comments***

3. The indicated allowability of claims 7 and 8 is withdrawn in view of the newly discovered reference(s) applied below. Rejections based on the newly cited reference(s) follow.

### ***Request for Continued Examination***

4. The Request for Continued Examination (RCE) under 37 CFR 1.53 (d) filed on July 23, 2004 is acceptable and a RCE has been established. An action on the RCE follows.

***Claim Rejections - 35 USC § 112***

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 1 – 12 and 36 – 40 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "fine" in claims 1 – 12 and 36 - 40 is a relative term which renders the claims indefinite. The term "fine" is not defined by the claims, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. This rejection can be overcome by either including a particle size in the claims or by removing the word "fine" from the above mentioned claims. For purposes of evaluating the prior art, the Examiner has interpreted "fine" to apply to any particle sizes.

***Claim Rejections - 35 USC § 102***

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. Claims 1 – 3, 5, 6 and 9 – 12 are rejected under 35 U.S.C. 102(b) as being anticipated by Bulkowski (U.S. Patent No. 4,618,509).

Regarding claim 1, Bulkowski discloses a substrate (*Figure 1 below – element A*) provided with a layer of aligned fine particles (*element B*), comprising a first monomolecular organic coating film (*element C*) formed on a surface of the fine particle, said first monomolecular organic coating film comprising a first functional group (*element D*) and a second functional group (*element E*) at ends of the molecule, wherein said first functional group is bonded to the fine particle, a second monomolecular organic coating film (*element F*) formed on the surface of the substrate, said second monomolecular organic coating film comprising a third functional group (*element G*) and a fourth functional group (*element H*) that is different from the second functional group at ends of the molecule (*col. 4, lines 4 – 29 and col. 5, lines 60 - 62*), wherein said third functional group is bonded to the substrate, wherein a chemical bond is formed between the second functional group and the fourth functional group, whereby the fine particles are immobilized and aligned on the substrate (*col. 2, lines 18 - 33*).

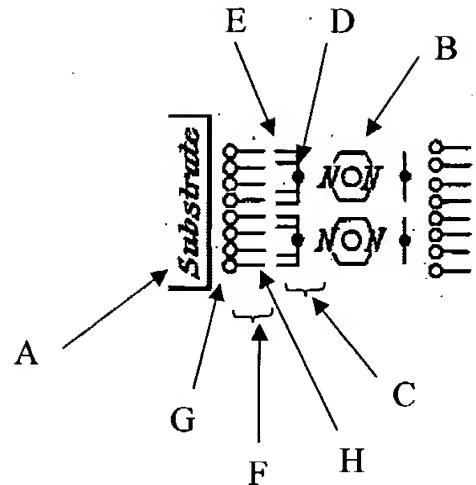


Figure I: Reproduction of Figure 2 from Bulkowski

Regarding claims 2 and 3, Bulkowski discloses single or multiple layers of aligned fine particles (*Figures and col. 2, line 64 bridging col. 3, line 18*).

Regarding claims 5 and 6, Bulkowski discloses self-assembling films which are patterned and aligned on the surface of the substrate (*Figure I above and examples*).

Regarding claim 9, Bulkowski discloses that the two organic coating films (*Figure I, elements C and F*) are chemically bonded to each other (*col. 4, lines 53 – 60*).

Regarding the limitation(s) in the exact type of bond, the Examiner notes that this limitation(s) are/(is a) process limitation(s) and is/are not further limiting in terms of the structure resulting from the claimed process. Specifically, in a product claim, as long as the prior art product meets the claimed structural limitations, the method by which the product is formed is not germane to the determination of patentability of the product unless an unobvious difference can be shown to result from the claimed process

limitations. In the instant case, regardless of how the two organic coating films are bonded to each other, the *structure* of the resulting product is substantially identical.

Regarding claims 10 – 12, Bulkowski discloses particles and substrates meeting applicants' claimed Markush limitations (col. 3, lines 62 – 65 and col. 5, lines 11 – 16). The Examiner notes that iron particles are known magnetic particles.

9. Claims 1, 2, 4 – 7 and 9 – 12 are rejected under 35 U.S.C. 102(e) as being anticipated by Black et al. (U.S. Patent App. No. 2002/0022111 A).

Regarding claim 1, Black et al. disclose a substrate (*Figure 3 – element 1*) provided with a layer of aligned fine particles (*element 3*), comprising a first monomolecular organic coating film (*element 4 and Paragraph 0078*) formed on a surface of the fine particle, said first monomolecular organic coating film comprising a first functional group (*Paragraph 0105*) and a second functional group (*Paragraph 0105*) at ends of the molecule, wherein said first functional group is bonded to the fine particle, a second monomolecular organic coating film (*Paragraph 0080*) formed on the surface of the substrate, said second monomolecular organic coating film comprising a third functional group (*Paragraph 0080*) and a fourth functional group (*Paragraph 0080*) that is different from the second functional group at ends of the molecule (*Paragraphs 0080 and 0081*), wherein said third functional group is bonded to the substrate, wherein a chemical bond is formed between the second functional group and the fourth functional group, whereby the fine particles are immobilized and aligned on the substrate (*Figure 3 and Paragraphs 0030 - 0063*).

Regarding claim 2, Black et al. disclose single layers of aligned fine particles (*Figures*).

Regarding claim 4, Black et al. disclose particles meeting applicants' claimed size limitations (*Paragraph 0019*).

Regarding claims 5 and 6, Black et al. disclose self-assembling films which are patterned and aligned on the surface of the substrate (*Figure 3 and examples*).

Regarding claim 7, Black et al. discloses particle locations meeting applicants' claimed limitations (*Figure 3*).

Regarding claim 9, Black et al. disclose that the two organic coating films are chemically bonded to each other (*Paragraphs 0030 - 0063*). Regarding the limitation(s) in the exact type of bond, the Examiner notes that this limitation(s) are/(is a) process limitation(s) and is/are not further limiting in terms of the structure resulting from the claimed process for the reasons cited above. In the instant case, regardless of how the two organic coating films are bonded to each other, the *structure* of the resulting product is substantially identical.

Regarding claims 10 – 12, Black et al. disclose particles and substrates meeting applicants' claimed Markush limitations (*Paragraphs 0079 – 0080*).

***Claim Rejections - 35 USC § 103***

10. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bulkowski as applied above, and further in view of Heath et al. (U.S. Patent No. 6,159,620).

Bulkowski is relied upon as described above.

Bulkowski fails to disclose the diameter of the fine metal particles meeting applicants' claimed limitations.

However, Heath et al. teach that it is known to use particle sizes meeting applicants' claimed limitations for use in electronic applications since nanosize particles possess "a number of proposed advantages over bulk sized electronic devices" (col. 1, lines 13 – 22 and col. 4, lines 33 – 44).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Bulkowski to use particles meeting applicants' claimed size limitations as taught by Heath et al., since such particles possess "a number of proposed advantages over bulk sized electronic devices".

11. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Black et al. ('111 A1) as applied above, and further in view of Black et al. (U.S. Patent No. 6,162,532).

Black et al. ('111 A1) is relied upon as described above.

Black et al. ('111 A1) fail to disclose using accumulated layers of particles versus a single layer.

However, Black et al. ('532) teach that patterned arrays for magnetic recording can comprise multiple layers, wherein each layer is formed in an identical fashion (*Figure 5*) in order to produce a medium possessing multiple recording layers, and hence increased recording density.

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Black et al. ('111 A1) to use multiple layers of aligned particles meeting applicants' claimed limitations as taught by Black et al. ('532) in order to produce a medium possessing multiple recording layers, and hence increased recording density.

12. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Black et al. ('111 A1) as applied above.

Black et al. ('111 A1) is relied upon as described above.

Black et al. ('111 A1) teach that the relative sizes of the particles and the width of the concave portion can be varied to effect the recording and bit densities in a patterned magnetic recording medium (*Paragraphs 0097 - 0101 and Figure 3*) as well as for fabricating electronic arrays (*Paragraph 0078*). Therefore, the Examiner deems that it would have been obvious to one having ordinary skill in the art to determine an amount of the relative values of the width of the concave portion versus the particle size meeting applicants' claimed limitations by optimizing the results effective variable through routine experimentation. *In re Boesch*, 205 USPQ 215 (CCPA 1980); *In re Geisler*, 116 F. 3d

1465, 43 USPQ2d 1362, 1365 (Fed. Cir. 1997); *In re Aller*, 220 F.2d, 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Specifically, the Examiner notes that Black et al. ('111 A1) teach preferred embodiments wherein 9, 16 or even 25 particles (3x3, 4x4 or 5x5 arrays) are located in the concave portions. Since one of ordinary skill in the art would readily possess the knowledge that excess space in the concave portion equates to loss recording density, the optimization between the relative width of the concave portion and the particle diameter is deemed to be within the knowledge of one of ordinary skill in the art given the teaching in Black et al. ('111 A1) regarding the effect of particle density on areal recording density.

13. Claims 36 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Covington (U.S. Patent No. 6,730,395 B2) and further in view of Black et al. ('111 A1) as applied above.

Regarding claims 36 and 37, Covington teaches that using arrays of patterned fine particles (*Figures 1 and 4a*) for use in a magnetic head (*col. 1, lines 13 – 20*) comprising a MR device (*col. 4a, element 10*) and a shield provided outside the MR device (*elements 66 and 68*), wherein a pair of electrodes (*elements 84 and 86*) for passing a current through the fine magnetic particles (*col. 2, line 50*).

The limitations “formed to change an electrical resistance between the electrodes by an external signal magnetic field” and “the shield is provided for preventing a magnetic field other than the signal magnetic field from entering the magnetoresistive

device" are functional limitation(s). As defined in the MPEP, "[a] functional limitation is an attempt to define something by what it does, rather than by what it is (e.g., as evidenced by its specific structure or specific ingredients). There is nothing inherently wrong with defining some part of an invention in functional terms. Functional language does not, in and of itself, render a claim improper. *In re Swinehart*, 439 F.2d 210, 169 USPQ 226 (CCPA 1971)" – MPEP § 2173.05(g). However, the examiner notes that "where the Patent Office has reason to believe that a functional limitation asserted to be critical for establishing novelty in the claimed subject matter may, in fact, be an *inherent characteristic of the prior art*, it possesses the authority to require the applicant to prove that the subject matter shown to be in the prior art does not possess the characteristics relied on" (emphasis added) - MPEP § 2183.

In the instant case, the claimed limitation(s) are functional limitation(s) and are deemed to necessarily flow from the structure of the prior art since the prior art is substantially identical in composition and/or structure. The examiner's sound basis for this assertion is that the layers disclosed in Covington are used for the same exact purpose as claimed by applicants, i.e. electrode and shield layers in a MR device.

Covington fails to disclose a first and second monomolecular film.

However, Black et al. ('111 A1) teach a first and second monomolecular films meeting applicants' claimed limitations as described in Paragraph 9 above in order to form uniform, high density patterned arrays possessing good stability (*Paragraph 9 above and Paragraph 0017 in Black et al. ('111 A1)*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Covington to use a first and second monomolecular coating meeting applicants' claimed limitations as taught by Black et al. ('111 A1) in order to form uniform, high density patterned arrays possessing good stability.

14. Claim 38 is rejected under 35 U.S.C. 103(a) as being unpatentable over Covington in view of Black et al. ('111 A1) as applied above, and further in view of Yamamoto et al. (U.S. Patent No. 6,147,843).

Black et al. ('111 A1) and Covington are relied upon as described above.

Neither Black et al. nor Covington disclose a Yoke-type MR head.

However, Yamamoto et al. teach that Yoke-type MR heads meeting applicants' claimed limitations are known equivalent structures for the use of MR devices in MR heads (*Figures 7 – 9 and col. 5, lines 6 – 42*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Covington in view of Black et al. ('111 A1) to use a Yoke-type MR structure meeting applicants' claimed structural limitations as taught by Yamamoto et al. since one of ordinary skill in the art would have readily possessed the knowledge that MR devices can be used in both shield-type and yoke-type heads with substantially equivalent effects.

15. Claims 39 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heath et al. ('620) in view of Black et al. ('111 A1) as applied above.

Regarding claim 39, Heath et al. teach semiconductor devices (*Title*) comprising fine particles (*Figure 3, element 14*) wherein a barrier layer serving as a tunnel barrier layer (*element 12*) provided on a semiconductor substrate (*element 10*) and an electrically insulating layer is provided on the barrier layer and the fine particle layer (*element 16*)

Heath et al. fail to teach a first and second monomolecular organic coating film meeting applicants' claimed limitations.

However, Black et al. ('111 A1) teach a first and second monomolecular films meeting applicants' claimed limitations as described in Paragraph 9 above inorder to form uniform, high density patterned arrays possessing good stability (*Paragraph 9 above and Paragraph 0017 in Black et al. ('111 A1)*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Heath et al. to use a first and second monomolecular coating meeting applicants' claimed limitations as taught by Black et al. ('111 A1) inorder to form uniform, high density patterned arrays possessing good stability.

Regarding claim 40, Heath et al. teach semiconductor devices (*Title*) comprising a barrier layer serving as a tunnel barrier layer (*Figure 4, element 28*) between a gate insulating film (*element 32*) and a semiconductor substrate (*element 26*), the barrier layer provided on the semiconductor substrate.

***Response to Arguments***

**16. The prior rejection of claims 1 – 6, 9 – 12 and 36 - 40 under 35 U.S.C § 102 and/or 103(a) – various references**

Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection.

The above noted rejection has been withdrawn because applicant(s) amendment(s) have set forth new limitations (e.g. first, second, third and fourth functional groups associated with first and second monomer units) no longer anticipated, nor rendered obvious, by the above noted rejection.

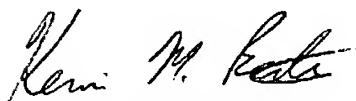
***Conclusion***

17. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Applicants have included several IDS references in the present application that the Examiner deems are relevant to the broadest claims (particularly the generic "substrate provided with a layer of aligned fine particles" of claims 1 – 12). These references are Natan (U.S. Patent No. 5,609,907), Koichi et al. (JP 11-350153 A) and Naito (JP 2001-184620 A). In all cases, the references disclose fine particles adhered to a substrate via two monomer units with the same or different functional groups on each ends of the monomers (i.e. 102-type art).

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin M Bernatz whose telephone number is (571) 272-1505. The examiner can normally be reached on M-F, 9:00 AM - 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Deborah Jones can be reached on (571) 272-1535. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Kevin M. Bernatz, PhD.  
Primary Examiner

October 14, 2004